

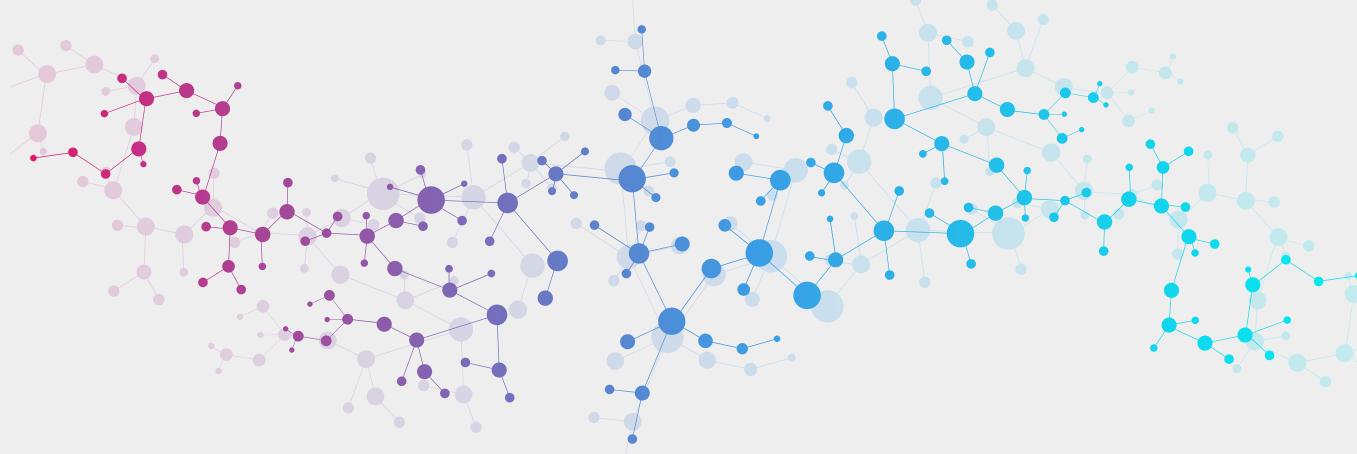


Immunization Information Technology: A Guide for Pediatricians on Immunization Information Systems and Two-Dimensional Barcoding

Why Immunization Information Systems (IISs) are important and how 2D barcoding can help increase accuracy and save time.

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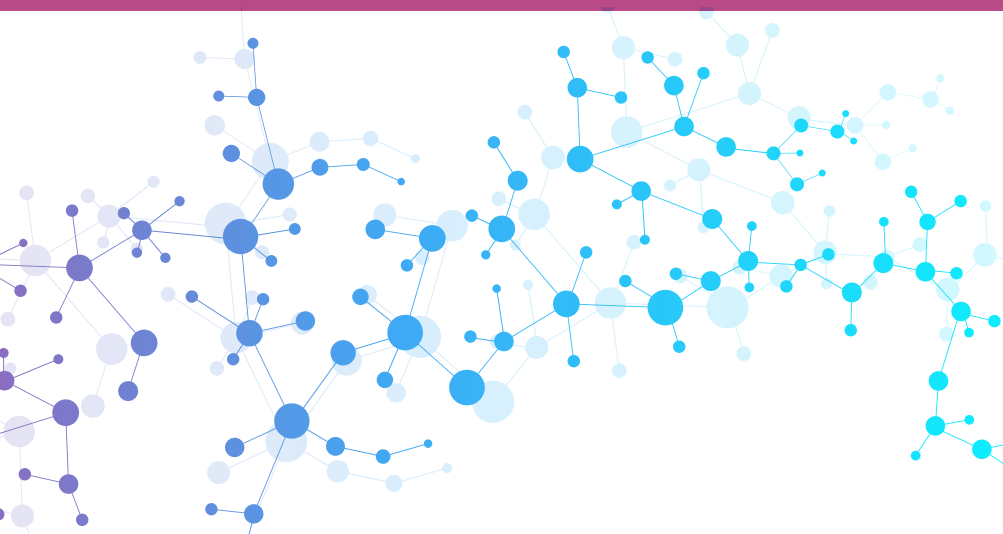
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1

Immunization Information Systems: A Guide for Pediatricians



Immunization information systems (IISs) are confidential, population-based, computerized information systems that collect vaccination data across the lifespan within a geographic area from vaccination providers. You may also have heard these systems referred to as vaccine or immunization registries.

Pediatricians play an important role in communicating with both state and local public health entities and electronic health record (EHR) vendors about the functionality needed to help pediatric practices and patients receive the full benefits from IISs and their interaction with EHRs.

Why is this important now?

- There are many benefits to using an IIS—the more complete the vaccination data in the registry, the better the assessment and forecasting capability will be. Widespread adoption and use of IIS technology reduces unnecessary health care costs and optimizes quality improvement by:
 - > Increasing providers' ability to assess up-to-date status of patients and improve vaccination rates for their practice
 - > Assisting with recalling patients for overdue vaccinations
 - > Sending of reminders to patients for upcoming vaccinations
 - > Minimizing unnecessary administration of duplicate vaccines by providing a consolidated patient vaccination record



- > Supporting clinical decision making at the point of care by forecasting vaccines needed at the time of a visit and for future visits
- > Improving vaccine inventory management
- > Identifying vulnerable patients during an outbreak of a vaccine-preventable infection
- > Promoting continuity of care by supporting portability of a patient's vaccination record
- EHR vendors must support exchange of immunization information according to Health Level 7 (HL7) standards to receive incentive payments for Centers for Medicare and Medicaid Services Promoting Interoperability Incentive Programs.
- Technological standards are sufficiently developed to allow for widespread use.

Optimal Features of IISs and EHRs

There are several key features of IISs and EHRs, listed below. As users of these systems, pediatricians play an important role in understanding the optimal features and capabilities of both, communicating them to stakeholders and helping to develop future enhancements.

Integration with EHRs: As use of EHRs by physician practices and health care facilities becomes the norm, the ability of an EHR to exchange data with an IIS is critical. Optimally, information on immunizations delivered in an office or health care facility is automatically sent from the EHR to an IIS without requiring extra work by the pediatrician, and EHRs should be able to query an IIS for consolidated immunization records.

- **Bi-directionality:** An IIS should be able to receive electronic immunization information from and deliver it to an EHR in a physician office or health care facility. Optimally, an EHR implements processes in the following way. When a query is sent to an IIS, it should be performed within the EHR, without the need to open a web browser or leave the EHR to request/receive information. In addition, the user who generates the query should be allowed to review the result for accuracy and then import relevant information directly back into the EHR without significant additional work. This is critical, as every time a person needs to manually enter immunization information, there is a potential for human error.
- **Real-time retrieval and near real-time delivery of information:** If a patient is at an office or facility and there is an opportunity to immunize a patient, the information regarding that patient's vaccination history should be retrieved in real-time when the query is asked.
- **Uses current standards:** The current standards for exchange of immunization information are defined by HL7 guidelines. In addition, EHR vendors are incentivized to support exchange of immunization information per HL7 specifications.
- **Support for vaccine evaluation and forecasting logic:** The most robust IIS support health care providers with immunization evaluation and forecasting tools designed to automatically determine recommended immunizations developed by the Advisory Committee on Immunization Practices (ACIP) of the US Centers for Disease Control and Prevention (CDC) that are needed when a patient presents for vaccination. Forecasting and clinical decision support for immunization (CDSi) tools allow health care providers to receive patient specific information from the IIS about which vaccines are due or overdue, as well as which vaccines are up-to-date, and are most effective if data within the IIS are as accurate and complete as possible.



State law that supports “opt-out” consent or mandatory

reporting with no right to opt out: The more patient immunizations recorded in an IIS and the more health care providers who use that data, the more useful the information becomes. State legislation for patient participation should ideally require every patient be enrolled unless there is specific refusal of consent to participate. This is preferable to requiring the patient/parent to give informed consent to have information sent to the IIS. Learn more about your state or jurisdiction’s IIS practices, and whether reporting to it is mandated, at: <https://www2a.cdc.gov/vaccines/iis/iissurvey/Legislation-survey.asp>.

Development of Memorandums of Understanding (MOU) with neighboring states/regions:

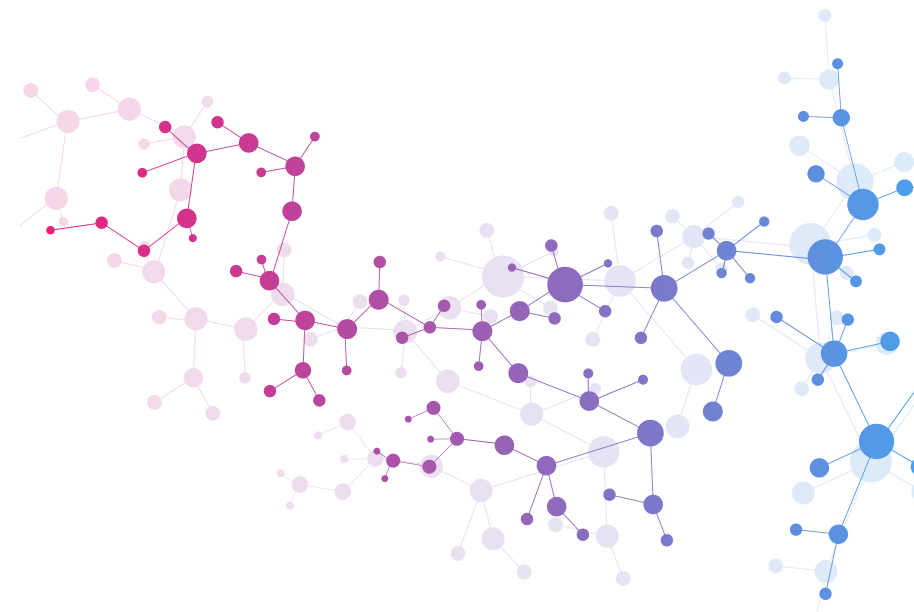
IISs are managed at the state or local level according to state legislation or regulation. It is critical that state IIS leadership collaborate with health departments, pediatricians (chapters of the American Academy of Pediatrics), family physicians (chapters of the American Academy of Family Physicians), community health care providers, and their counterparts in neighboring states and regions to promote data exchange between IISs across geopolitical jurisdictions. Patients regularly move across state lines or may reside in one state near a border but receive medical care in another, and physicians practice medicine along state borders—neither should prohibit complete immunization data exchange.

Incorporating data through the lifespan: While vaccine information is critical for preventive care of infants, children, and adolescents, IIS data also support adult immunization. An optimal IIS maintains data on patients throughout their lifespan. This can be critical for elderly patients, individuals with health complications, and for adults who come in contact with infants and children.

Access for other immunization stakeholders: Other important stakeholders, including pharmacies, early childhood centers, day care facilities, camps, and private and public-school systems should have access to IIS information. This removes the need for physicians and health care facilities to complete multiple vaccination record forms and allows other stakeholders direct access to this critical information. Parents/patients should also have direct access to complete vaccination records, either from the patient portal within the medical home (with queries to a registry) or directly from IISs.

To access the most current AAP policy on IIS go to the [AAP Gateway](#) and search for Immunization Information Systems.

Note: the CDC defines a “fully operational” IIS as one that includes 95% enrollment or higher of all catchment area children less than 6 years of age with 2 or more immunization encounters administered according to ACIP recommendations. Ideally an IIS should have ALL data on ALL children immunized for a complete vaccine history, except for patients who have opted out.





2

Immunization Information Systems: Why Use Them in Your Practice



Benefits for pediatric practice:

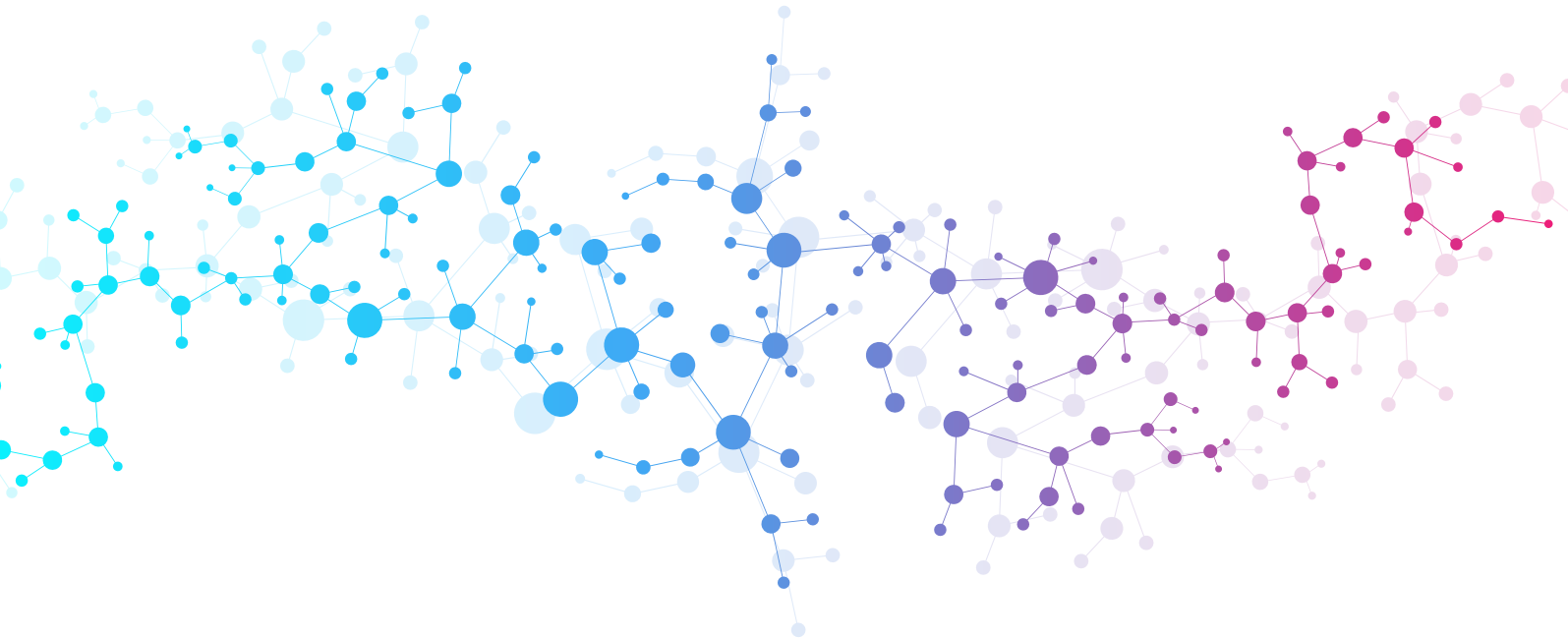
- Maximizes opportunity to administer all recommended vaccines through forecasting and CDSi.
 - > The most robust IISs support health care providers with immunization evaluation and forecasting tools designed to automatically determine the recommended immunizations (developed by the Advisory Committee on Immunization Practices [ACIP] of the CDC) that are needed when a patient presents for vaccination.
 - > Forecasting and CDSi tools allow health care providers to receive patient specific information from the IIS about which vaccines are due or overdue, as well as which vaccines are up-to-date, and are most effective if data within the IIS are as accurate and complete as possible.
- Minimizes unnecessary administration of duplicate vaccines
- Assists with ordering and management of Vaccines for Children (VFC) program vaccines, ensuring adequate supplies in the office
- Assists with recalling patients for overdue vaccinations
- Sending of reminders to patients for upcoming vaccinations
- Identification of incompletely immunized patients
- Identification of vulnerable patients during an outbreak of a vaccine-preventable disease

Benefits for patients:

- Helps physicians and other health care providers make optimal health care decisions for patients based on information in an IIS, minimizing the need for a return visit to receive vaccinations that were deferred due to incomplete information
- Provides a department of health with the necessary information to contact patients/parents directly if a vaccine is recalled
- Provides a department of health with the necessary information to notify patients who may be vulnerable to a specific infectious disease for which there is a local outbreak

Additional IIS Resources

- [American Immunization Registry Association](#)
- [CDC Getting Started with IIS](#)
- [CDC About Immunization Information Systems](#)
- [CDC Community Guide—Vaccination Programs: Immunization Information Systems](#)
- [CDC Immunization Information System \(IIS\) Functional Standards, v4.0](#)
- [CDC 2013–2018 Immunization Information System \(IIS\) Functional Standards](#)
- [CDC Report—Progress in Childhood Vaccination Data in Immunization Information Systems—United States, 2013–2016](#)
- [State and Jurisdictional IIS Contact Information](#)





3

Immunization—From Delivery to Administration: 2D Barcode Workflow



This workflow describes using a two-dimensional (2D) barcode scanner for vaccines in conjunction with an Electronic Health Record (EHR) in your office.

Recent study results released by the CDC showed use of a 2D barcode scanner **increased accuracy** when documenting vaccine lot number, expiration date, and National Drug Code (NDC). In addition, use of a 2D barcode scanner **saved an average of 21 seconds per vaccine** in documentation time. 2D scanning, when properly implemented, reinforces three of the “Five Rights” of medication use: right medication; right dose; and right time.

Effective 2D barcoding relies, in large part, on the hardware and software of the EHR in use. Following is a description of a “best practice” workflow and important considerations for use of a 2D barcode scanner, with regard to vaccine inventory management, documentation, and administration in the office. (See *Key Questions to Ask Your EHR About 2D Vaccine Barcoding* in section 4.)

1 The vaccine arrives in the office. After confirming the appropriate temperature has been maintained, and that the contents in the shipment are correct, the 2D barcode scanner is used to scan the vaccine into the office's inventory, maintained in the EHR. For this step, either the 2D code on the primary packaging (unit of use, vial or syringe) or the secondary packaging (unit of sale, the box) can be scanned. This action will populate the following information into the EHR: NDC code (which contains the manufacturer, the product, and the trade package size), the lot number, and the expiration date. *(Please note, if the unit of sale 2D code is scanned, the NDC will be different from the unit of use 2D code, ONLY with regard to the trade package size).* The only information that will need to be entered manually into the EHR is the number of doses received and whether the vaccine is privately funded or provided by the Vaccines for Children Program

2 During a patient visit, immunization order(s) are placed by the clinician and assigned to the appropriate office personnel.

3 Immunizations ordered are retrieved from the refrigerator or freezer.

4 The 2D barcode scanner is used to scan the 2D barcode on the vaccine (unit of use). At this point, your EHR should alert you with a warning if any of the following occur:

- the particular vaccine has not been ordered
- it is too soon for the vaccine to be given
- the preparation is not appropriate for the patient's age
- a vaccine from the wrong funding source is pulled
- another lot number of the same vaccine has a shorter expiration date
- this vaccine has expired

Ideally, forecasting logic would also 'warn' the clinician at the time the order is placed. This would be a double check.

5 The EHR then matches the vaccine scanned to the appropriate order.

6 The vaccine is administered to the patient.

7 Documentation of administration, including site, route, and name of person administering vaccine, is entered in the EHR, by staff. Documentation of the vaccine name, lot number, expiration date, NDC code, and manufacturer is entered by the 2D barcode scanning process.

8 Information is electronically sent from the EHR to the state or jurisdiction immunization registry.

To find more information on 2D and other Immunization topics, visit: aap.org/immunization




¹ Deloitte Consulting. Findings Report: 2D Vaccine Barcode Scalability Pilot. 2018. <https://www.cdc.gov/vaccines/programs/iis/2d-vaccine-barcode/downloads/2D-Findings-Report-508.pdf>



4

Key Questions to Ask Your EHR About 2D Vaccine Barcoding



The success of using two-dimensional (2D) barcoding for immunization documentation is multifactorial. An important determinant of success is how well a practice's electronic health record (EHR) incorporates the vaccine barcoding process into its system. Asking your EHR vendor the following questions can help determine your barcoding capability and streamline the process.

Getting Started with 2D Barcode Scanning

- Does the EHR have 2D vaccine barcode scanning capability?
 - > If no, will the system have the capability in the future? When?
- Does the EHR recommend certain 2D barcode scanners or require certain scanner specifications?
- Does the scanner have the capacity to read both positive (black on white) and negative (white on black) 2D barcodes?
- Does the EHR vendor offer volume pricing on scanners?
- What does the EHR charge to implement the 2D vaccine barcode scanning feature?
 - > Is there an initial install price? What is the amount?
 - > Is there an ongoing monthly fee? What is the amount? Is it per provider or per practice?
- What does the EHR do with regard to training staff and configuring the system and scanners?
 - > Is there an additional cost for these services?

2D Barcode Scanning Programming

- Is there programming in place for vaccine inventory management?
- Is there programming in place for vaccine administration?
- When administration of a vaccine is recorded using a 2D barcode scanner, is the inventory count automatically reduced?
- Once a particular lot number is depleted from the EHR inventory, will the system allow additional doses to be given if the scanner scans that lot number?
 - > What warning is given if the system shows zero doses?
- Will the EHR allow for either the unit-of-sale or unit-of-use 2D barcode to be scanned? (Requires the [CDC NDC IIS crosswalk table](#).) *Consider that the secondary package (box) can be easier to scan. With the CDC crosswalk available, the 2D barcode on the secondary package will load the appropriate information into the patient record.*
- How often does the EHR update to include current information from the CDC NDC IIS tables?

Is the EHR programmed to scan the 2D barcode on Vaccine Information Statement sheets?

Administration Documentation and Management

- When a vaccine's 2D barcode is scanned, does the EHR match the vaccine with an appropriate order, or simply populate the first field available in the EHR?
- Is the EHR capable of deciphering and reorganizing the component parts of the scanned 2D code, per the 2D barcode standard set by the CDC? *Consider that if the vaccine manufacturer has not put the components in the correct order, and the EHR is unable to "reorganize" them, the system must then allow for manual entry of data.*

- Does the EHR have a forecasting logic system that will alert you if a vaccine scanned is not appropriate due to: the vaccine being ordered too soon (either between doses of the same vaccine, or between doses of different vaccines—Varivax and MMR vaccines); or, the patient's age not being appropriate?
- Is the EHR 2D barcode module set up so that it will alert you if: the vaccine is expired; from the wrong funding source; is not one which has been ordered, active in the office's inventory, and/or the one with the shortest expiration date?
- Is the EHR programmed to decode and identify both active components of a vaccine which requires reconstitution? (Pentacel is one example.)
- Is the EHR programmed to document sterile diluent through barcoding?
- Is the EHR capable of tracking who uses barcoding for documentation, as opposed to manual entry? *Consider that having a log can determine if certain staff members are struggling with the process, if certain 2D barcodes are more difficult to scan, and how well the 2D process is working, with regard to documentation accuracy—as opposed to manual entries. Knowing this allows you to remind specific staff to use the scanner for documentation.*
- Is the EHR programmed to automatically populate the billing software, so that no charges are missed? What information is populated? (For example, some insurers require NDC code.)



Office Functionality

- Which scanners, corded or cordless, will work best in the practice's physical set-up, will streamline workflow, and be best received by staff?
Consider the effect on workflow of cords, which can be difficult and potentially discourage use of 2D scanner.
- What are the pros and cons of corded versus cordless scanners?
 - > If scanner is cordless/connects via Bluetooth, it will work with only one workstation at a time. *Consider the effect on workflow of “unpairing and pairing” by multiple users for each vaccine.*
 - > If scanner is connected via cord, does the recommended corded scanner have a variable length cord, which will facilitate ease of use?

To find more information on 2D and other Immunization topics, visit: aap.org/immunization

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